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CONTINUOUS IMPROVEMENT IN TREASURY'S DEBT MANAGEMENT PROGRAM

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THE BURDEN OF HISTORY

This article reports on how the Government, through the United States Department of the Treasury's (Treasury") debt management team, fulfilled its responsibility to disseminate critical auction information directly, quickly and accurately to the public to achieve substantial cost savings to the taxpayer. The limited focus of this article is to explain how Treasury's debt managers were able to more quickly disseminate critical market information (auction results) to the public within seconds of its being calculated by Treasury's Automated Auction Processing System (TAAPS) using eXtensible Markup Language (XML) technology. Treasury's debt managers firmly believe that the Government will achieve the desired outcome of lower borrowing costs from this improvement. However, we will leave to other interested researchers the task of quantifying Treasury's savings in borrowing costs because of faster release times.

The application of the XML technology was part of a long-term strategy to attain Treasury's goal of delivering its auction results to the public within two-minutes of the competitive auction close. This goal was achieved on August 4, 2003, when the Treasury released its 13- and 26-week Treasury bill results in less than two minutes after the competitive auction close.

In order to accomplish the goal of two-minute auctions, an XML project team was created. The project team developed a close working partnership or an alliance with the major financial news services. The project team encouraged the news services to develop the necessary communications infrastructure and reengineer their internal processes for the purpose of allowing straight-through information processing from Treasury's auction processing systems to their subscribers' computer terminals around the world. The project team also had to reengineer Treasury's own internal processes and procedures in order to successfully apply XML technology to the auction results release process. Ultimately, Treasury was able to eliminate a time-consuming, error-prone process for releasing its critical auction results to the public by using XML technology.

HISTORICAL PERSPECTIVE OF AUCTION AUTOMATION

The Treasury has long been a pioneer in applying emerging technologies to auctioning and issuing its marketable debt securities. Flexibility, service, and flawless processing operations have been the keys to its 80-year history of success. This is especially true when it comes to releasing

its auction results to the public. Over the last 30 years, Treasury has continuously reengineered its internal processes and procedures to more quickly receive bids from auction participants, assemble and aggregate the bid information, calculate the auction awards, and disseminate the results to the public. Over time, Treasury has succeeded in releasing its auction results faster to the public, and its debt managers expect to incur lower borrowing costs because of the faster release times.

In order to ensure that the auction results are reported to the public quickly and accurately, Treasury's debt managers have worked hand-in-glove with a highly trained and reliable corps of reporters from the major news services who are located at Main Treasury's pressroom in Washington, D.C. In the past, Treasury has sent its auction results to the Treasury press corps in several ways, e.g., years ago results were hand-delivered, then faxed, and, recently, they were electronically sent to pressroom printers.

While the Bureau of the Public Debt ("BPD") has been conducting auctions since the late 1930's, the most significant changes to the auction process have occurred only in the last decade. The majority of these changes were requested in the policy advise contained in "The Joint Report" issued by the Treasury, the Securities and Exchange Commission, and the Federal Reserve. The report was prompted by the abuses in the government securities market in the early-1990s that resulted in short squeezes. By late 1991, Treasury had already taken steps to replace its manual process of calculating its auction results with a PC-based computer program.

In response to the "Joint Report," Treasury hastened the development of Treasury's Automated Auction Processing System ("TAAPS"), a mainframe application built by Treasury and the Federal Reserve to receive and process bids. The development of this mainframe auction processing application occurred coterminously with the efforts to modify the FedLine software already used by the primary dealer community for Federal Reserve Bank Open Market functions. FedLine Automated Auction ("AA"), a new software application, was developed to provide a front-end interface between the dealers' trading rooms and TAAPS. In April 1993, TAAPS was implemented, which allowed primary dealers to submit auction bids directly to Treasury.

Another significant step came in 1997, when TAAPS was equipped with an auction calculation module. This was a critical enhancement that helped further speed up the release of the auction results. This enhancement to TAAPS allowed the auction calculation process to be performed more quickly and accurately.

In 1998, Treasury initiated TAAPSLink v1, which allowed submitters to bid directly to Treasury over the World-Wide Web. In 1999, TAAPSLink v1 was connected directly to TAAPS, which allowed for straight through processing of tenders.

OVERVIEW OF THE TREASURY AUCTION PROCESS

BPD is Treasury's manager of debt financing operations. As such, one of BPD's chief responsibilities is to conduct all of the auctions of Treasury marketable securities needed to meet the governments' financing needs. In 2002, BPD conducted 188 auctions, raising over $3.8 trillion. By 2004, Treasury expects to conduct over 200 auctions and award over $4.5 trillion to successful bidders through the auction process. The Treasury auction process works as described below.

Prior to each auction, BPD issues an announcement identifying the date/time of the auction, the term, the type, and the offering amount of the securities to be auctioned. In all auctions, the general public is invited to submit either competitive or noncompetitive bids. Noncompetitive bids do not specify a yield or discount rate; instead, bidders agree to accept the high yield or discount rate determined at the auction. Competitive bids, on the other hand, specify the yield or discount rate at which bidders are willing to purchase the securities.

Generally, all noncompetitive bids are accepted into the auction and must be submitted

and received by the Treasury prior to the noncompetitive closing time (usually 12:00 noon ET). Immediately after the deadline for receipt of competitive bids (usually 1:00 p.m. ET), Treasury initiates the calculation process by accepting all noncompetitive bids. Competitive bids are then accepted in ascending order in terms of their stated yield or discount rate until the amount of accepted bids covers the announced offering amount. The yield or rate at which the offering amount is covered becomes the highest accepted yield or discount rate in the auction. Since November 1998, Treasury has sold all its securities using the single-price auction methodology, in which each successful competitive bidder and all noncompetitive bidders buy securities at the price equivalent to the highest accepted yield or discount rate.

Once the auction results are determined, Treasury releases the results to the financial press and, in turn, the results are immediately released to the general public over the financial wire services. Prior to the implementation of the electronic release using XML, Treasury provided the pressroom reporters (located at Main Treasury) with an advance copy of the auction results. In turn, the reporters would manually input the information into their respective news services' computer systems. Release of the auction results was embargoed until each reporter in Treasury's pressroom had completed entering the results data into their back offices' computer systems. This manual process prevented the processing and release of auction results within two-minutes following the competitive auction close. Hence, it became apparent that Treasury had to re-engineer the auction results release process in order to achieve its two-minute goal.

POLICY DECISION TO RELEASE AUCTION RESULTS TO THE PUBLIC FASTER

Prior to 1965, the auction results were released the next day, and by 1966, the results were released the same day around 6:30 p.m. By 1980, the results were being released around 4:30 p.m., and by 1985, the results were released by 3:15 p.m. In 1990, the results were released by 2:00 p.m. and by 1995, Treasury had reduced the average release time to 1:45 p.m. In 2000, the average release time was 1:27 p.m. During the 2001 - 2002 period, the release time was trimmed by 20 minutes.

In mid-2002, a high-ranking debt manager at Treasury announced that a "top priority has been to reduce the time it takes us to release auction results. We believe that the faster and more predictable the release times, the less uncertainty bidders will bear, and the lower the premium they will charge taxpayers. One of Treasury's highest priorities is to continuously improve the efficiency of the primary market, and the most effective way of attaining such an improvement is to further reduce the time it takes to release auction results."

That same year, Treasury debt managers also decided to accept all bids into the auction without human intervention or review. This new approach was dubbed "your bid is your bid." Prior to implementing this policy, Treasury had always performed a manual review of certain bids that were identified by TAAPS system edits for reasonableness. For example, if a system edit showed that a bidder was required to report its net long ("NLP") position, but it did not do so, the Treasury would contact the bidder to determine the amount of the NLP, and manually enter the amount into TAAPS. In order to perform this function, the auction would be halted long enough to enter the information into TAAPS. After "your bid is your bid" took effect, the practice of manually reviewing bids for reasonableness was discontinued, but only after over fifty systems edits were reconfigured through a TAAPS application upgrade that was implemented in April 2003.

Hence, with the implementation of the XML file in January 2003, and the upgrade to TAAPS in April 2003, Treasury had finally achieved a fully straight-through auction process. The chart below (Figure 1) highlights the changes in auction release times from 1981 - 2003, and demonstrates Treasury's commitment to the rapid release of auction results:

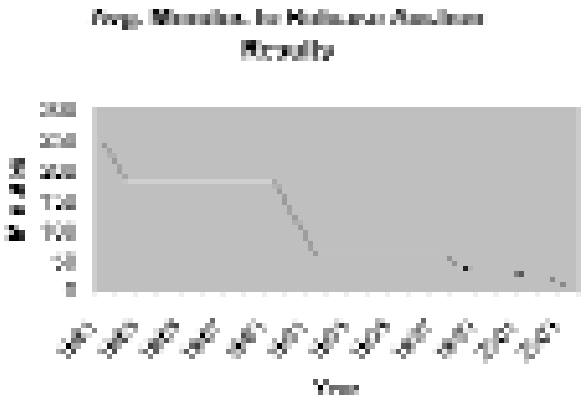

Figure 1

TREASURY'S JOURNEY TO A TWO-MINUTE MARKET RELEASE

Treasury debt managers had previously identified the shortcomings of the auction results release process prior to the decision to move to the two-minute auction. Treasury had long desired to adopt a straight-through processing approach for the release of auction results, particularly to eliminate some of the manual processing required by the financial news services. Treasury wanted to take full responsibility for getting critical market data to the public without relying on an intermediary (Treasury's pressroom reporters) to manually re-process the data. However, the intention of this initiative was not to by-pass the press. The pressroom reporters had always played a critical role in the dissemination of auction results and were viewed by Treasury as a partner in ensuring that the auction results were disseminated to the public quickly and efficiently. Also, it was deduced that the pressroom reporters could serve as a possible backup to release the auction results in an actual contingency situation if Treasury's automated systems were unavailable.

Treasury debt managers decided to support the development of an XML auction results feed to the press because it was the only way to meet the two-minute goal. Also, the financial community had already endorsed the adoption of XML technologies, evidenced by the Bond Market Association's recommendation of the SWIFT/FIX model for communication of pre-trade information via XML. Hence, because the private sector had already begun using XML in many of its critical operations, Treasury's debt managers concluded that it was safe to use XML technology for releasing its results to the public. Moreover, this would be but the first use of XML technology in the auction-processing environment.

A very detailed XML data schema or "structured framework of data components" was developed to incorporate the full array of data elements that could potentially be present on any single Treasury auction results press release. That schema, along with the proposed specifications and technical architecture of the electronic auction results release was distributed for comment to all news services who at the time were also receiving advance copies of the auction results in Treasury's pressroom.

During the development cycle, Treasury's debt management staff met frequently with systems and editorial staff of each news service that had expressed an interest in participating in the new process. Their collective suggestions and concerns were aggregated and considered as an automated straight-through process was developed. During the data-modeling phase, Treasury relied on input from the news services representatives to modify its data schema to better serve the needs of the financial press.

After completing the necessary enhancements to TAAPS, Treasury began to test with the news services. This consisted of Treasury coordinating and conducting a series of "mock auctions" using the new XML process to release the results. Treasury held mock auctions that tested the systems capability to provide all available auction results to the news services, and validated the test results produced by the news services. The XML release was finally implemented on January 13, 2003, and the auction results were now consistently made available to the public within seconds after the XML file was generated by TAAPS.

CURRENT TIMELINE FOR TREASURY'S AUCTION PROCESS

The timeline depicted in Figure 2 below shows the major steps involved in today's auction environment beginning with a routine 1:00 p.m. close of competitive bidding:

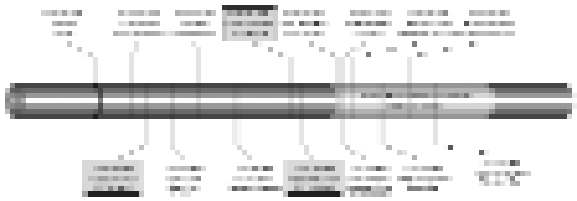

Figure 2

Generally, the close of competitive bidding in Treasury auctions occurs precisely at 1:00 p.m. , and the auction calculation process, on command, is initiated immediately after the close. The auction calculations are usually completed by approximately 1:00:15 P.M. As soon as the calculations are completed, an operator commands TAAPS to generate a text file containing a formatted version of the press release. This text file is manually downloaded from the TAAPS mainframe and converted into a PDF version of the auction results. At precisely 1:01:15 P.M., the text file is manually moved into a directory in which the Treasury Auction Results Posting Application ("TARPA") is running. TARPA automatically processes the text file into PDF format and places it on Public Debt's Internet site, usually requiring a processing time of approximately fifteen to twenty seconds. At precisely 1:01:20 P.M., an operator commands TAAPS to generate a machine-readable XML file containing auction results data that, within ten to fifteen seconds, is made available to members of the electronic press for dissemination. This XML file is also reformatted into a readable data table and made available on a dedicated Web page that displays the auction results to the reporters present at Main Treasury's pressroom who are logged in to the site.

At approximately 1:01:35 P.M., a member of the auction staff enters the market release time into TAAPS. This entry initiates the release of the auction results information via FedLine to the primary dealer community. Finally, members of the auction team prepare notices ("broadcast" messages) to TAAPSLink users of the results and send an e-mail announcing the availability of the PDF version of the results on Public Debt's Internet site.

CONTINGENCY FOR FAST AND ACCURATE RELEASE OF AUCTION RESULTS

The auction process is one of the Government's most critical processes and great care has been taken to ensure that adequate backup is available to ensure that the auction results can always be issued to the public quickly and accurately. Figure 3 shows the two primary release mechanisms that now exist for the distribution of auction results to the public. The XML file is made available to the electronic news services, and the PDF results file is posted to Public Debt's Web site as shown above. The XML feed provides for the instantaneous distribution of the results to participating members of the press, and in turn, the information is instantly made available to the news services' subscribers. The server housing the XML feed has redundant hardware backup that provides for instantaneous server rerouting in the event that the primary server fails for some reason. In the event of a total failure, i.e., both primary and backup servers fail or there are difficulties with the XML feed arising from software or server management issues, the reporters in Main Treasury's pressroom are immediately notified that they will have to rely on the PDF auction results to complete the delivery of the information to the electronic news services.

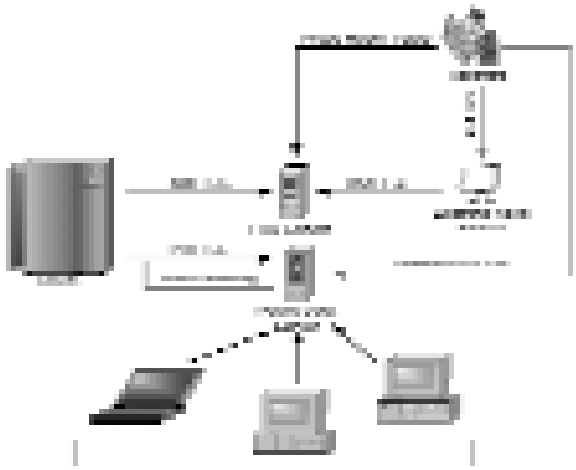

Figure 3

The process of releasing the auction results in PDF format also has several layers of contingency built into it. The server housing the PDF file, like the server housing the XML feed has implicit hardware contingency. In the event of a failure in the TARPA application, the auction staff must release the results without the aid of automation by manually posting them directly to the Internet. If both the XML and PDF files are unavailable because of systems issues, Treasury auction staff will immediately fax the results to the pressroom, and in turn, the pressroom reporters will manually enter the results in the electronic news services' computers in the same manner as the auction results were released prior to the implementation of the XML feed in January 2003.

CONCLUSION

Overall, Treasury debt managers feel that "quicker results mean less exposure for bond dealers who bid in the auctions, which in turn lowers Treasury's borrowing costs. Speedier results have eliminated a lot of market risk, even if technology upgrades have opened the door to some "operational risk." Ideally, the Treasury would like its auctions to run perfectly every time for all participants, and any error that occurs is unacceptable no matter how rarely such errors occur. The Under Secretary of Domestic Finance, Peter Fisher and Assistant Secretary of Domestic Finance, Brian Roseboro are committed to eliminating "market risk" by having faster and consistent release times of auction results. Market participants have expressed support as to the usefulness of this e-Government initiative. For example, Gerald Lucas, Senior Government Bond Strategist recently said of this initiative: "I think it's great what they've done. It lowers the risk."

The financial press also seems pleased with the outcome of faster and consistent release times for the auction results. According to one reporter who represents a major news service, "Treasury's efforts to speed up the auction process have helped us get the results out faster to our readers. The new system has gone through some growing pains, but bond dealers have generally appreciated the faster results."

As the two-minute auctions became a reality on August 4, 2003 with the auctions of 13- and 26-week bills, a brief review of Treasury's experience in reducing the time between the auction close and the release of its results might be helpful.

Briefly, aside from several minor technology glitches that have delayed the release of the auction results (the delays attributable to technological problems were not caused by XML technology), "human error" has emerged as the most likely cause of delaying the release of auction results in the future. Years ago when the auction processing operations took 25-30 minutes from the competitive close to be completed, operator errors were rarely the cause of a delay because any mistake, once detected, could be fixed within minutes after the close. Hence, Treasury could still get the results out within 25-30 minutes because such errors were under the "radar." However, in today's auction processing environment, any operator error is much more noticeable, and could delay the results until the problem was fixed.

Based on our research, even though the timeliness standard for the release of auction results has been reduced from 5 minutes + or - 60 seconds to two minutes + or - 30 seconds, we have concluded that there should not be an appreciable increase in the actual number of times where Treasury's auction results are delayed.

Beyond the improved market efficiencies that the two-minute auction provides, the faster release of auction results also just makes good business sense. Like all Executive Branch Agencies, Treasury is dedicated to meeting those objectives outlined in the President's Management Agenda. Specifically, the two-minute auction demonstrates Treasury's commitment to meeting the Agenda's e-Government initiative. The faster release of auction results to the public will:

- Provide citizens with speedy access to Government services;
- Make Government more transparent and accountable; and
- Reduce the expense and difficulty of doing business with the Government.

In summary, while some may question the wisdom of delivering faster auction results because of changes to Treasury's auction processing systems and the adoption of the "your bid is your bid" policy, it should be noted that the auction processing systems are constantly being improved, and made more robust, and reliable. Development and implementation of the XML file is just another step in the chronicles of Treasury's attempt to continuously improve its debt management program. Treasury is committed to making continuous improvements in the auction process through technological innovation. Furthermore, Treasury's announcement of "your bid is your bid" as policy has made the bid submission process completely transparent and unambiguous.

Finally, there's more to come. Treasury's debt management watchers can look forward to seeing the implementation of another exciting initiative, which is scheduled to be unveiled in October 2003. Treasury's web-based bidding application provides new software for our primary dealers, which will run over a virtual private network ("VPN"). At a later date, Treasury plans to deploy this web-based bidding application to the desktops of our non-primary dealer auction participants around the globe. However, the main difference is that instead of submitting bids over a VPN using frame relay technology, they will use the application over the Internet. Stay tuned because Treasury's auction processing and operational systems are being enhanced further as we strive for continuous improvement in Treasury's debt management program.

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1) The author prepared this article with the assistance of two members of his staff, Messrs. John Lilly and Steve Beresnson.
2) "Joint Report on the Government Securities Market", Department of the Treasury, Securities and Exchange Commission, and Board of Governors of the Federal Reserve System, January 1992, U.S. Government Printing Office, Superintendent of Documents, Washington, D.C., ISBN 0-16-036093-5.
3) Assistant Secretary Brian C. Roseboro, "A Review of Treasury's Debt Management Policy; UBS Eighth Annual Reserve Management Seminar for Sovereign Institutions, " June 3, 2002 (teleconference).
4) "ISO 15022 XML Pre-Trade Model," S.W.I.F.T., Financial Information eXchange Protocol, March 31, 2002 (http://www.bondmarkets.com/ecommerce/ISO15022_PreTrade_MessageIOI.doc)
5) A competitive bid that is received by 12:59:59 p.m. is considered timely, but a bid received at 1:00:00 p.m. is considered late, and is automatically rejected by TAAPS.
6) "Auction Upgrades Help Bond Market More than Flubs Hurt," by Rebecca Christie, Dow Jones Capital Markets Report, March 20, 2003.
7) Id.
8) Comments from Rebecca Christie of Dow Jones Newswires, July 24, 2003.